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10/525,775

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Didier Roziere

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9920

466

7590

05/17/2006

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EXAMINER

VALONE, THOMAS F

ART UNIT

PAPER NUMBER

2858

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/525,775

Applicant(s)

ROZIERE, DIDIER

Examiner

Thomas F. Valone

Art Unit

2858

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 18-26 is/are rejected.
- 7) ☒ Claim(s) 16 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6-24-05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "10" has been used to designate both transmitting plate T and electronic processing module in Fig. 2. It is suggested for T and R, that "10" and "11" be replaced with -- 12 -- and -- 14 -- respectively. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the

Art Unit: 2858

applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: T1, T2, TA, and TB are not labeled in Fig. 4, which are referred to on p.9, line 1. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Specification***

4. The disclosure is objected to because of the following informalities:
- a. The term "lateral edge 10" on page 6, line 1 and "lateral edge 11" on page 6, line 2 should be replaced with - - lateral edge - - and - - lateral edge - - respectively, to be consistent with the drawing corrections recommended above.
  - b. The electrode term "RA, RB" on page 8, line 14 should be replaced with - - R1, R2 - -.

- c. All of the headings that are required for the specification are missing. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Appropriate correction is required.

#### **Arrangement of the Specification**

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or

REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a).

"Microfiche Appendices" were accepted by the Office until March 1, 2001.)

(f) BACKGROUND OF THE INVENTION.

(1) Field of the Invention.

(2) Description of Related Art including information disclosed under 37  
CFR 1.97 and 1.98.

(g) BRIEF SUMMARY OF THE INVENTION.

(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).

(i) DETAILED DESCRIPTION OF THE INVENTION.

(j) CLAIM OR CLAIMS (commencing on a separate sheet).

(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).

(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A

"Sequence Listing" is required on paper if the application discloses a  
nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if  
the required "Sequence Listing" is not submitted as an electronic  
document on compact disc).

***Claim Objections***

5. Claim 1 is objected to because of the following informalities:

- a. The term "transmitting plates" in line 6 should be changed to --  
transmitting plate --.

Art Unit: 2858

- b. The term "modulated" in line 12 should be deleted, for lack of antecedent basis in the claim, since no modulator nor modulation signal has been claimed prior to that limitation, in view of the specification (p. 10, line 7).
  - c. The term "said second" in line 6 should be changed to - - said first - - because there is only one receiving plate (R) claimed.
  - d. The term "non-contact" in line 1 does not seem to be consistent with Figs. 2 - 5, which prove that the circuit wires necessarily contact every electrode involved in the measurement. (See Towner reference for comparison.)  
Appropriate correction is required.
6. Claims 2 and 4 are objected to because of the following informalities: The term "transmitting electrode (TB)" in lines 5 and 11 of claim 2 and line 3 of claim 4 should be replaced with - - third transmitting electrode (TB) - - . Appropriate correction is required.
7. Claim 5 is objected to because of the following informalities: The term "receiving electrode of inverse polarity (TB)" in line 2 (p. 5) should be replaced with - - third transmitting electrode of inverse polarity (TB) - - . Appropriate correction is required.
8. Claim 16 is objected to because of the following informalities: The phrase "the third" in line 4 should be changed to - - a third - - and the phrase "the first and second" in line 7 should be changed to - - a first and second - - for lack of antecedent basis in the claim. Appropriate correction is required.
9. Claim 20 is objected to because of the following informalities: Applicant is requested to place the claim in better form by deleting "according to one of the claims 1 to 11" from line 2. Appropriate correction is required.

Art Unit: 2858

10. Claim 22 is objected to because of the following informalities: The phrase, "system according to one of the preceding claims" in line 3 should be replaced with - - system according to one of the claims 1 - 17 - - for the sake of proper antecedent basis, since only those claims constitute systems. Appropriate correction is required.

11. Claim 23 is objected to because of the following informalities:

- a. The term "transmitting electrode (TB)" in line 4 and line 10 should be replaced with - - third transmitting electrode (TB) - - .
- b. The term "modulated" in line 13 should be deleted, for lack of antecedent basis in the claim, since no modulator nor modulation signal has been claimed prior to that limitation, in view of the specification (p. 10, line 7).

Appropriate correction is required.

12. Claims 24 and 25 are objected to because of the following informalities: The term "that the analogue" in line 2 should be replaced with - - that an analogue - - since there is no antecedent basis for that limitation in the claims. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1 - 10, 12 - 15 and 18 - 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mast of record in view of McCormick (5,748,005) and Northrop.



Regarding claims 1 and 22, Mast teaches the same sensor module (Fig. 5, p.9) as in the instant application (1, Fig. 3) with all of the same physical and geometrical features of the transmitting plate fixed to a first object and a receiving plate connected to a second object and transmitting and receiving plates facing each other. Furthermore, Mast teaches the means of applying high-frequency excitation signals to the transmitting electrodes ("drive voltages will originate from one segment," p. 10, line 27, and "drive DAC," "drive voltage 1," "drive voltage 2," Fig. 3 and 5) and means of taking them from the receiving electrodes ("sense signal can be read on the other segment," line 27, p. 10). Mast also includes a means for processing the signals (amp, rectifier, integrator, ADC, Fig. 3) in order to supply signals, "similar to those used for Keck" (line 38, p. 10) representative of the relative displacement of the two electrodes (Fig. 3, p. 8 and "CELT displacement sensor electronics," line 38, p. 10). Mast characterizes the transmitting and receiving electrodes to constitute a first capacitance varying as a function of distance separating them (gap size, line 2, p. 10) and a second capacitance varying as a function of relative misalignment of the plates (displacement  $\delta z$ , last line, p. 9 and vertical displacement, line 1, p. 10).

Mast does not explicitly describe the capacitance inverse and ratio which are used for the output circuitry.

McCormick (5,748,005) of the same art teaches the voltage output signal, as a function of distance, representing the inverse of the capacitance (col. 8, line 30) which is normally expected. McCormick explains that it is because an increase in capacitance

Art Unit: 2858

creates a decrease in voltage (col. 8, line 60) and vice versa, thus making the voltage proportional to distance.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used McCormick's teachings of measuring a voltage signal output of a capacitor as representing the inverse of its capacitance, which is the standard relationship of voltage and capacitance in every capacitor, and apply it for the benefit of distance measurement, as suggested by McCormick.

Mast as modified by McCormick does not explicitly teach the ratio of capacitances which is expected from the bridge circuit used in both references.

Northrop describes the output voltage details of a bridge circuit (eq. 5-16, p. 145) which is normally the difference of two impedance ratios. More specifically, the parallel C bridge (Fig. 5.6, p. 148) used to measure capacitors, has an operating equation 5.30 (p. 148) which can be rearranged to prove that this bridge, like the bridge of McCormick (Fig. 3), uses the ratios  $C_{XP} / C_4 = R_3 / R_4$  and therefore McCormick's output voltage is proportional to the ratio of the second capacitance to the first capacitance,  $V_2$  (eq. 5-16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the standard parallel C bridge, for measuring the ratio of capacitances, as taught by Northrop and the capacitance inverse measurement, as taught by McCormick with the sensor module of Mast for the benefit of achieving a non-contact measurement of distance with good accuracy.

Regarding claims 12 –15, Mast further discloses the system for measurement with the transmitting and receiving plates comprise supports made of a flexible material

Art Unit: 2858

that is a polyamide, namely a Kapton substrate (line 1, p. 9) which is known in the art as a flexible insulating material as in claims 12 - 13. Mast further discloses that the flexible material constituting the supports is made from a flexible printed circuit (printed circuit on a Kapton substrate, line 1, p. 9), as in claim 14. Mast further indicates that the supports made of flexible material are glued to the mirrors (bonded to the edge surface, line 1, p. 9 and Fig. 4) as in claim 15.

Regarding claims 18 – 21, Mast further discloses a sensor module for measuring the relative position between two adjacent mirror segments (Fig. 4, p. 9), as in claim 18, in which the transmitting and receiving plates respectively are fixed to facing lateral edges of two adjacent mirror segments in close proximity to the active surfaces of the mirror segments (Fig. 4 and 5, p. 9) as in claim 19, for the application in the field of large-sized telescopes with segmented mirrors (Fig. 1, p. 2) as in claim 21.

Furthermore, Mast discloses the position actuators (Fig. 6, p. 12) which control the position of the mirror segments, including piston, tip and tilt (p. 4) as in claim 20.

Regarding claims 2 – 5 and 23, Mast further discloses the placement of the first transmitting electrode substantially facing a first receiving electrode (left-hand gap sensor, Fig. 5, p. 9) as well as a second and third transmitting electrode (drive 1 and drive 2, Fig. 5, p. 9) facing a second receiving electrode (sense electrode, Fig. 5, p. 9), all of the same geometrical shape, as in claim 3, with the second and third electrode being of the same geometrical shape, arranged parallel and in close proximity as in claim 4. Mast further discloses the second receiving electrode (sense a-b, Fig. 5) as arranged with a receiving plate (one segment, line 6, p. 9) such that the projection of the

Art Unit: 2858

second receiving electrode on the transmitting electrode is included within a perimeter including both second and third transmitting electrodes (Fig. 4). Mast further teaches the application of an inverse polarity on the third transmitting electrode (positive pulse image, drive 2 voltage, Fig. 5 and lower image in Fig. 3) as compared to the second transmitting electrode (negative pulse image, drive 1 voltage, Fig. 5) as in claims 2 and 23. As to claim 23, the duplication of transmitting and receiving electrodes is further disclosed in Mast (s,t and r,q in Fig. 5). Mast also designates a "first electrode" electrically connected in parallel, from the citations mentioned above and the disclosed drive and sense circuitry (line 27, p. 10). Since they actually constitute a single, first capacitor as a result, it is also ordinary and well-known in the art to which this invention pertains.

Regarding claim 6, Mast further discloses that the two first transmitting electrodes and the second transmitting electrode (s,t and d,c in Fig. 5) are electrically connected and excited by the same HF signal ("s,t and d,c are on the same segment," line 6, p. 9 and "drive voltages will originate from one segment," line 27, p. 10) and that the first receiving electrodes (r,q in Fig. 5) are electrically connected ("r,q and a,b are on one segment, line 6, p. 9 and "sense signal can be read on the other segment" line 27, p. 10).

Regarding claims 7 and 24, McCormick further discloses the voltage output signal, as a function of distance, representing the inverse of the capacitance (col. 8, line 30) which is normally expected. McCormick explains that it is because an increase in capacitance creates a decrease in voltage (col. 8, line 60) and vice versa, thus making

the voltage proportional to distance. McCormick's teachings of measuring a voltage signal output of a capacitor representing the inverse of its capacitance, which is the standard relationship of voltage and capacitance in every capacitor, obviates the claimed analogue calculation of an inverse of the single, first capacitance of the first transmitting electrodes and the first receiving electrodes of claims 2 and 23.

Regarding claims 8 and 25, Northrop further discloses the conventional De Sauty Bridge for parallel capacitors (Fig. 5.7, p. 148) which produces a signal output that measures the ratio of the difference between the capacitances and the sum of the capacitances (eq. 5.36, p. 149), which is directly analogous to  $CA-CB / (C1 + C2)$  and obviates the analogue calculation. Furthermore, in light of the specification (line 7, p. 10), "conventional bridges" are admitted to be part of the measurement system.

Regarding claim 9, Mast further discloses a preamplifier stage (Pre Amp, Fig. 5) for pre-amplifying the measurement signals taken from the first and second receiving electrodes (r,q and a,b, Fig. 5) which is normally upstream of the analogue calculation means, to those skilled in the art.

Regarding claim 10, Mast further discloses a measurement system with sensor electronics "similar to those used for Keck" (line 38, p. 10) which includes analog calculation means (amplifier, rectifier, integrator and ADC in Fig. 3) designed to process analog offset information (offset DAC, Fig. 3) supplied by digital-to-analog conversion means connected to digital control means (drive DAC, Fig. 3).

Regarding claim 26, Mast further discloses an extensive evaluation of the sensor noise expected from the measurement signals (p. 5 – 8) and the importance of a

Art Unit: 2858

reasonable initial noise goal standard deviation  $\sigma$  of less than 7 nanometers (p. 6) for the sensor noise, thus obviating an ultra low noise preamp (Fig. 5) of the measurement signals taken from the receiving electrodes, to those skilled in the art to which this invention pertains.

15. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mast, McCormick and Northrop, further in view of Shimomura (5,440,501).

The teachings of Mast, McCormick and Northrop are reviewed above.

Mast as modified by McCormick and Northrop does not include a means for demodulating the signals resulting from the analog calculations.

Shimomura, from the same field of endeavor, teaches analog calculation means that comprise demodulating the signals (col. 11, lines 5 – 20) resulting from the analog calculations (col. 4 – 5) of the capacitive displacement sensor signals.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used Shimomura's teaching of adding demodulation to the processing of analog signal calculations in the invention of Mast as modified by McCormick and Northrop for the benefit of recovering the measured displacement value for an output, as suggested by Shimomura (col. 11, line 40).

#### ***Allowable Subject Matter***

16. Claims 16 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2858

17. The following is a statement of reasons for the indication of allowable subject matter: A system for measurement with transmitting and receiving plates connected to a modulator, with a charge amplifier connected to a multiplier and a second charge amplifier and to the output of a second modulator, connected to a synchronous demodulator controlled by an oscillator, whose output is connected to an integrator, has not been found in the prior art.

### ***Conclusion***

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Towner (4,522,528) teaches a first and second capacitor possessing a common electrode and opposite polarity, where the common electrode is an unwired, non-contact ground; CELT Report Number 34 teaches distance measuring sensor electronics.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas F. Valone whose telephone number is 571-272-8896. The examiner can normally be reached on 9 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on 571-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2858

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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SUPERVISORY PATENT EXAMINER